The American Nuclear Society awarded its Materials Science & Technology Division Special Achievement Award to Idaho National Laboratory Fellow David Petti for his work on coated particle nuclear fuel technology.

INL Fellow's success brings recognition and satisfaction

By Brianna McNall, *INL Nuclear Science & Technology intern*

Idaho National Laboratory employees came back triumphant from this summer's American Nuclear Society meeting with more than a dozen elected to division committees, but one man was given a special honor.

David Petti, an Idaho National Laboratory Fellow, was selected for the ANS Materials Science & Technology Division Special Achievement Award. He was recognized for his work on the coated particle fuel technology that broke a world performance record last fall.

The Special Achievement award, which recognizes a single significant contribution to a field, was last bestowed in 2004.

Petti received the award at the June 2010 ANS meeting.

"It was nice to be recognized by that peer group," Petti said.

The Special Achievement award isn't given often — the last time was in 2004. The award is meant to recognize someone for a single significant contribution to one's field. Petti's work is bringing coated particle fuel technology in the U.S. "back in the game," as he likes to say. But he wouldn't take the credit for himself.

"It's really a team effort," he said. Oak Ridge National Laboratory, Babcock and Wilcox, Inc., and General Atomics were all involved in the project.

The team was able to test 300,000 particles at once in INL's Advanced Test Reactor (ATR). They were tested in groups under different conditions to see how the fuel would hold up. Of those 300,000 particles, not one failed. Fuel failure is a result of the outer coating of a particle forming a crack which releases fission gasses to a real time monitor instead of containing those gasses in the particle.

The coated particle nuclear fuel technology that Petti's team is developing and testing broke a world performance record last fall.

Petti remembers less successful attempts.

"The Germans did this in the '80s," he said. When the U.S. tried to duplicate those results, it couldn't.

"It wasn't supposed to fail," he said. He was a young engineer at the time, plugging the experiment data into computer plots. Something kept going wrong. "Like anything with successful technology development, you have to do eight or nine things right."

"It's very gratifying, having been the young engineer," he said. "It's very heartening to be making these great strides in the technology."

The first round of fuel has been moved to the Hot Fuel Examination Facility at the INL Materials & Fuels Complex. The next step is to test the fuel at extremely high temperatures inside the facility's hot cells to discover the extent of the particle coating containment's effectiveness. The second capsule, which uses industrially manufactured fuel particles, is now being irradiated under high temperatures in ATR. A third experiment will then use particles designed to fail, which will test the capabilities of the graphite containment.

Because these tests are performed within one of the reactor's closed experiment loops, the limits of the particle coating can be evaluated in a controlled, safe environment. Such tests will form the basis for the safe operating procedures of any future reactors designed for this fuel.

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